

WHAT IS CLAIMED IS:

1. A method of separating lightweight grains from raw grains using a vertical cylinder having, in the order from the top, an exhaust port, a cylindrical primary separation space, a conical secondary separation space, and an unloading port comprising:

a primary separation step of introducing raw grains containing the lightweight grains, which are to be separated, together with primary air into the primary separation space in the direction to allow the material to whirl upward along the inner wall surface of the cylindrical section of the primary separation space, so that most part of the lightweight substances contained in the raw grains are guided to the exhaust port by the upwardly flowing airflow in the pipe and the raw grains and part of lightweight grains stay in a certain flow area by frictional resistance with respect to the wall surface generated by whirl and then are dropped into a secondary separation space by their own weight;

a secondary separation step of blowing secondary air to the lower portion of the secondary separation space through a slit to the center toward the raw grains dropping into the conical section in the secondary separation space on the downside in the primary separation step so as to blow the lightweight substances in the raw grains upward to the primary separation space; and

a discharging step of taking the raw grains with the lightweight grains removed continuously out from the unloading port at the lower portion of the conical section.

2. A method of separating lightweight grains from raw grains according to

Claim 1, further comprising a tertiary separation step of blowing tertiary air from below the secondary air blowing position upwardly to blow remaining lightweight grains to the secondary separation space.

3. A device for implementing the method of Claim 1 comprising:

a cylindrical section having an exhaust port at the upper portion thereof;

a conical section provided below the cylindrical section;

a raw grain feeding unit for feeding raw grains in the direction to whirl the raw grains upward along the inner periphery of the cylindrical section above the conical section;

a lightweight grain separating unit for taking the lightweight grains in the raw grains out from the upper portion of the cylindrical section;

a secondary air blowing unit for blowing the secondary air toward the raw grains being dropped from the cylindrical section upward at the lower portion of the conical section to move the fine grains upward to the cylindrical section; and

a unit for discharging raw material from the lower portion of the conical section.

4. A device according to Claim 3, wherein the raw grain feeding unit is an upwardly oriented tangent induction pipe opening on the inner wall surface of the cylindrical section or an induction unit with spinner disposed at the center of the lower portion of the cylindrical section.

5. A device according to Claim 3, wherein the secondary air blowing unit comprises a secondary air intake chamber connected via a slit provided at the

lower end of the conical section for taking compressed air therefrom.

6. A device according to Claim 5, wherein the secondary air blowing unit blows a high-speed secondary airflow from the slit toward a stabilizer provided at the lower end of the conical section.

7. A device according to Claim 6, further comprising a tertiary air blowing unit, the tertiary air blowing unit blowing tertiary air from between the stabilizer and a unit for discharging the raw material toward the stabilizer.

8. A method of separating powder bodies and the like from grains using a vertical cylinder having, in the order from the top, an exhaust pipe, a cylindrical primary separation space, a secondary separation space, and an unloading port, comprising:

a primary separation step of introducing grains containing the powder bodies and the like, which is to be separated, together with primary air into the primary separation space in the direction of whirling along the inner wall surface of the cylindrical section of the primary separation space, moving most part of the powder bodies and the like contained in the grains upward by airflow in the pipe, separating and discharging the powder bodies and the like from the exhaust pipe opening in the direction opposite to the whirling direction, and allowing the grains to drop into the secondary separation space by their own weights;

a secondary separation step of blowing secondary air to the lower portion of the secondary separation space through a slit to the center toward the raw grains dropping into the conical section in the secondary separation space on the

downside in the primary separation step so as to blow the remaining powder bodies and the like in the grains upward to the primary separation space; and

a discharging step of taking the grains continuously out from an unloading port at the lower portion of the secondary separation space.

9. A method according to Claim 8, comprising a tertiary separation step of blowing tertiary air upward from below the secondary air blowing position to blow the remaining powder bodies and the like to the secondary separation space.

10. A device for separating powder bodies and the like from grains comprising:

a cylindrical section having an opening of an exhaust pipe for discharging the powder bodies and the like at the upper portion thereof;

a conical section provided on the downside of the cylindrical section;

a grain feeding unit for feeding grains containing the powder bodies and the like so as to whirl in the cylindrical section in the direction not opposing the opening of the exhaust pipe along the inner periphery of the cylindrical section;

the secondary air blowing unit for blowing high-pressure air at the lower portion of the conical section from a circumferential slit on the conical section toward the grains containing the powder bodies and the like being dropped from the cylindrical section to move the powder bodies and the like upward to the cylindrical section; and

a unit for discharging the grains from below the secondary air blowing unit.

11. A device according to Claim 10, comprising the tertiary air blowing unit

for blowing tertiary air from below the secondary air blowing unit.

12. A device according to Claim 10, wherein the secondary air blowing unit blows a high-speed secondary airflow toward a stabilizer provided at the lower end of the conical section from the slit.